University of Alaska Fairbanks

Administration of Justice: Master's Project

A Historical Review of Forensic Science in Law Enforcement: Implications for the Enhancements of Forensic Science within the State of Alaska.

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Abstract

According to the 2015 census records presented on the State of Alaska website, Alaska has a population of 737,625 residents. The state of Alaska spans 586,412 square miles (State of Alaska, 2016, 1). With such a vast state, the need for enough law enforcement services is exceedingly important. The Alaskan 2013 Uniform Crime Report (UCR) asserts that there are 1,331 law enforcement officers within the state. Alaskan law enforcement officers have to conduct crime scene evidence collection and analysis along with other necessary tasks such as securing the crime scene, detaining suspects, and rendering aid to victims. With only the Alaska State Troopers, local law enforcement agencies, and the Alaska State Crime Laboratory in the state of Alaska assessing crime scenes, it is the purpose of this research to document the need for more on-scene forensic science services in Alaska. This research will conclude with the proposal of implementation of dedicated on-scene forensic services provided by non-sworn on-scene technicians within the current Alaskan law enforcement structure. This program will allow for a natural expansion of forensic science services in Alaska.

Keywords

Forensic science, crime, law enforcement, underdevelopment, evidence, civilian.

Introduction

"Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget."

-Edmund Locard, 'Locard's Exchange Principle' (Lyle, 2008, 7)

There is an underdevelopment of on-scene forensic science services in Alaska. Currently the forensic science services for the state are limited to a single State of Alaska Crime laboratory, Alaska State Troopers, and local law enforcement agencies. The low number of Alaskan law enforcement officers, along with the vast area in which Alaskan law enforcement need to oversee, spreads these forensic science resources very thin. In particular, Alaska State Troopers and local law enforcement officers have many other essential job tasks to complete such as conducting follow-up investigation by talking to witnesses, initiating traffic stops, and responding to emergency 911 calls. By requiring both Alaska State Troopers and local law enforcement officers to also conduct on-scene forensic science evidence collection and analysis takes time away from their other important duties. The other important duties for Alaskan law enforcement officers are ones that only commissioned officers. This predicament can be mitigated if a small number of trained civilian on-scene forensic science technicians are employed and utilized by each one of the five regions in Alaska.

The need for more on-scene forensic science services in Alaska is further demonstrated by the sheer amount of criminal cases, nearly all of which would benefit from forensic science

services. The table below shows the criminal offenses within the state of Alaska according to the Alaska Uniform Crime Report of 2013.

Table 1a.

Type of Crime	Number of Offenses
Murder	34
Rape	919
Robbery	620
Aggravated Assault	3,096
Burglary	2,901
Larceny	16,498
Motor Vehicle Theft	1,686
Total	25,754

Unlike the fast-paced fictional television shows, forensic science technicians or crime scene investigators are not only called upon crime scenes where a body is present. Latent fingerprint and trace evidence collection are examples of forensic science evidence that can be found at most crime scenes. Crimes such as burglary or assault equally warrant the need of forensic science services. Even looking at serological evidence collection at the scene of a rape can be imperative in solving a case and catching the perpetrator(s). Comparing these numbers with that of other states may seem as though Alaska has a manageable level of crime, but this is

not the case. Remember, the number of crimes is not the only factor to consider in the ability for Alaskan law enforcement to process crime scenes. The number of available officers is a pertinent factor in processing crime scenes. According to the 2013 Alaska Uniform Crime Report, there were only 1,331 law enforcement officers employed in Alaska. With a total of 25,754 crimes reported, and only 1,331 law enforcement officers to access the crime scenes, this shows a visible work overload for each officer.

Forensic science evidence collection and analysis takes a great deal of time away from other legitimate duties tasked to sworn law enforcement officers.. Photographing a crime scene, dusting for latent fingerprints, and swabbing blood samples are all forensic science tasks that can take a great deal of time. For this reason, it is important to have on-scene forensic science technicians who are trained and equipped to properly collect and analyze crime scenes in Alaska. The law enforcement officers and forensic science technicians can work together to conduct criminal investigations. A major consideration is that Alaska is a demanding state to police because of its weather conditions and sheer vastness. Additionally, the urban and rural components in Alaska create varying types of crime scenes which can be challenging when trying to collect and analyze evidence. By utilizing specially trained on-scene forensic science technicians by region, Alaskan law enforcement can be strengthened in numbers; all working together in a diverse and cohesive nature to assess crime scenes.

Among the many articles that will be discussed, I will be presenting three main case studies by Lambert et al., Goldstein, and Wilson and Gallop. Lambert et al.'s wrote the article *Differences in Forensic Science Views and Needs of Law Enforcement: A Survey of Michigan Law Enforcement Agencies*. This article conducted a study of Michigan law enforcement

agencies and reports their views of forensic science and their desire for further training in the subject.

Also, Lambert et al.'s research attempted to ascertain how forensic science impacted law enforcement officers and their desire for continued training in the various forensic science disciplines. Oversight is an important aspect of any agency. Agency oversight becomes crucial when dealing with the field of forensic science. Without a well-documented chain of custody, properly trained officials, and a constant check of evidence collection and storage standards the agency can begin to gain errors in its work. Goldstein (2011) discusses using a state's supervision to maintain a functional forensic science program

From detrimental outcomes, lessons can be learned to create successful future programs. Wilson and Gallop (2013) present the United Kingdom's Forensic Science Service (FSS) and discuss as to why a world-acclaimed facet for forensic science eventually disbanded. With reasons such as "inadequate funding and research, weak epistemic authority, and a lack of support for defence lawyers" (Wilson & Gallop, 2013, 69) the FSS found itself unable to continue functioning.

Before presenting a proposal for more forensic science services within Alaska, a detailed review of relevant forensic science literature will be provided. This will include a general review of the history of forensic science and thoughts about its scientific reliability. Throughout history, as a growing science, forensic science has been questioned as to its actual scientific basis. It is important to mention forensic science's application to criminal investigations. It is also necessary to evaluate how forensic science has been both used and neglected in criminal investigations in the past. Then we will look at the need for forensic science services throughout the state Alaska in modern day. After the presentation of this data, we will then conclude with a basic model for

forensic science services in Alaska. This model will provide each of the five regions with at least one to two on-scene forensic science technicians.

Methodology

The methodology for this narrative involved reviewing both printed resources and online academic peer-reviewed resources. The main printed resource used within this narrative are Hickman and Strom's text *Forensic Science and The Administration of Justice: Critical Issues and Directions* (2015). This text has several articles both by Hickman and Strom along with Peterson. Another printed resource used within this narrative is Peak's *Justice Administration: Police, Courts, and Corrections Management* (2016) for the analysis of budget formats. Both Lyle's book as well as Hickman and Strom's text was acquired from Amazon. Kingdon (2003) was a printed resource which was acquired from Professor Rob Duke of the University of Alaska Fairbanks Justice faculty. The Sir Arthur Conan Doyle story *A Study in Scarlet* was referenced from *The Works of Sir Arthur Conan Doyle* (1981). The Uniform Crime Report for the state of Alaska for 2013 and labor statistics were also accessed from the State of Alaska website. Also, two job positions for the City of Wilmington are presented in this research to show the difference in pay between sworn and civilian law enforcement positions. Both job positions from the City of Wilmington were acquired from online.

In regards to the online peer-reviewed resources, the articles written by Ballou et al. (2003), *Forensic Science* by Giannelli (2006), White et al. (2015), and Ge et al. (2014), Davis et al. (2014), Aleksander (2012), Reese (2015), Lambert et.al (2007), Strom & Hickman (2010), Houck (2006), Goldstein (2011), Wilson & Gallop (2013), Wilkerson (1994), and Colletti (1996) were all found through the search engine Academic Premier EBSCO Host. Through this search

engine the keywords of forensic science, crime, law enforcement, underdevelopment, evidence, and civilian were used. For the United States Census Bureau Quick Facts Alaska (2015) online resource, the Google search engine was used.

Literature Review

In forensic science's early years of implementation many skeptics doubted the field's scientific basis. Ballou (2003) notes in *Forensic Analysis* that forensic science is an applied science spanning the fields of chemistry, biology, botany, and physics. Forensic science technicians and investigators are expected to collect evidence as a means of proof for the court, but what is evidence? What is proof?

When looking at forensic science, the use of evidence and proof is one of the science's main functions for court cases. The *article Forensic Expertise and Judicial Practice: Evidence or Proof?* by Aleksander (2012) discusses whether or not evidence is considered "proof". Aleksander discusses proof as "directly and sometimes undeniably supports the validity of a thesis" (Aleksander, 2012, p.1149)Aleksander (2012) recognizes that forensic science plays a crucial role in presenting facts within the courtroom proceedings but further stipulates that the term "evidence" is often used synonymously with the term "proof" in medical writing (Aleksander, 2012). Looking at many day-to-day casual conversations, the same alternating of terms can be seen. It is the room for error in evidence that causes Aleksander (2012) to question if it can be given such a definitive standing. Aleksander (2012) continues to define evidence by criteria suggested by Stoyanov and Associates (2010). The criteria of evidence is as follows: (1) objective, (2) quantifiable, (3) standardized, (4) Applicable/Practical (Aleksander, 2012). Forensic science evidence may come close in ability to follow all four criteria for evidence as

presented by Stoyanov and Associates (2010) but it cannot be with the precise certainty of proof as described by Aleksander (2012).

When looking into forensic science, the technicians and investigators within the career field must be trained in efficient evidence collection techniques as well as the knowledge of what evidence to be collected. Though it is true that sometimes law enforcement officers will be in charge of what evidence will be collected, it is also important that a forensic science technicians be asked to use their knowledge of evidence to locate and collect evidence that will give the best results. For this, it is important for forensic science technician to acknowledge these four stipulations presented by Stoyanov and Associates (2010) as to what makes valid evidence.

As mentioned in the introduction, there are many types of agencies in which forensic science evidence is processed. Some evidence is sent off to state crime laboratories, while some police departments prefer to contract with private crime laboratories. Also, it has been noted that some police departments are creating "in-house" crime laboratories that are able to do minor forensic science evidence processing. Lambert et al. (2007) brings up interesting points in reference to the type and size of such law enforcement departments and how this affects the breadth of forensic science services able to be offered. Lambert et al.'s article highlights the differences between two main forms of law enforcement agencies seen in the United States: sheriff and local police departments. Sheriff departments deal largely with rural areas while local police departments tend to deal with urban areas (Lambert et al., 2007).

Lambert et al.'s research divided Michigan's agencies into rural, urban, and suburban categories. The category of agency type was divided into sheriff departments and local police departments. The study had the agency size categories of small, mid-sized, and large. A small department was considered to have under 20 employees, a mid-sized department had 21 to 89

employees, and a large department had 90 or more employees. Several questions were asked in this survey about who collects evidence at a crime scene, who analyzes the evidence collected at a crime scene, and perceptions on the importance of forensic science in relation to criminal investigations (Lambert et al., 2007, 419). The survey also collected information on the number of sworn officers and civilians employed the departments (Lambert et al., 2007, 419).

Lambert et al. (2007), research shows that 72% of all departments who had responded to the survey believed that forensic science is extremely important to criminal investigations. To present to opposite position, it was noted that 10% of the surveyed departments felt that forensic science was very unimportant in application to criminal investigations. The results showed that 52% of the departments had their own units or specially designated law enforcement officers to analyze and collect evidence.

Another question asked on the Michigan law enforcement survey was whether or not the department had their own crime laboratories. Only 16% of all of the departments reported to having their own crime laboratories. Of the 16%, it was noted that departments in urban areas were more likely to have their own crime laboratories (Lambert et al., 2007, 421). Additionally, the crime laboratories in the law enforcement departments ran less complex tests than available at state crime laboratories (Lambert et al., 2007, 421). Perhaps because of this, 72% of the law enforcement departments who were questioned would send their information to the state crime laboratories while the remaining departments would send their evidence to other crime laboratories such as privately owned laboratories. It can be seen that if a department does not have a crime laboratory, that they would naturally send their evidence to a state crime laboratory. But as previously mentioned, even the departments who had crime laboratories did not have the capacity to complete more extensive forensic science analysis. Finally, the survey showed that

only a small number of law enforcement departments utilized civilians employed as evidence collection technicians. This means that much of the forensic science evidence collection and analysis is being tasked to sworn officers with a variety of other job duties.

Like Michigan, more forensic science resources are available in the larger cities such as Anchorage and Fairbanks. But when you get to more remote areas of Alaska, forensic science services are at a minimum. Also, it was mentioned that only a small number of Michigan's law enforcement departments that were polled had civilians employed as evidence collection technicians. This means that much of the forensic science evidence collection and analysis is being tasked to sworn officers in Michigan. Adding yet another task to a sworn officer causes a great deal of stress to their workload.

Lambert et al. discusses that reason forensic science services will be in greater supply in larger department is because there is a greater need for the service (Lambert et al., 2007, 419). Respectively, smaller departments will be less likely to have as much forensic science resources (Lambert et al., 2007, 419). This concept is directly applicable to Alaska. Though areas such as Fairbanks and Anchorage are larger, there are smaller towns which may not have the capacity for extensive forensic science resources. With this thought, it might be more realistic for forensic science services in Alaska to be based in a larger city and span out to a region or area. The employment of civilian forensic science technicians could be used within Alaska to combat the problem that is being seen in Michigan. Many law enforcement officers are taught basic fingerprinting and trace evidence collection techniques when they are participating in one of the law enforcement training academies; this training is very helpful but does not cover all of the evidence collection techniques needed for a crime scene. But, if Alaskan law enforcement agencies were able to hire civilian employees, who were trained in the various disciplines of

collection and analysis techniques of evidence, the agencies would be able to better assess each crime scene without overtasking the sworn officers.

This Research started with an overall population size of 674 law enforcement departments in the state of Michigan in 2000 (Lambert et al., 2007, 419). Out of the 674 departments, 340 were randomly selected to participate (Lambert et al., 2007, 419). In order to acquire the information for the research a survey was sent out to all 340 law enforcement departments (Lambert et al., 2007, 419). The survey consisted of many questions including the following:

- What are the characteristics of the law enforcement agency?
- How many sworn officers are employed?
- How many civilians are employed?
- How crime scene evidence is collected?
- What is the Importance of forensic evidence in criminal investigations?
- Who collects the forensics evidence?
- Who analyzes the forensics evidence?

(Lambert et al., 2007, 419)

In correlation to the results, each department was noted on its type, size, and location (Lambert et al., 2007, 419). Only a total of 140 surveys were able to be used (Lambert et al., 2007, 419). Of these responses 40% were rural, 36% suburban, and 23% urban departments (Lambert et al., 2007, 420).

In the results, there was not a specific connection between the size and location of a department to its value of forensic science. When compiled the results were as follows:

Table 1b.

(What is the importance of collection of forensic science evidence in criminal cases?)

72%= Very Important
15%= Important
2%= Somewhat Important
1%= Unimportant
10%= Very Unimportant

(Lambert et al., 2007, 420)

What ideas can we pull from these results? The first idea that is mentioned in the research is that the size and location of a law enforcement department does not, in an overall sense, affect the opinion on forensic science services. In the results there was no general trend as to the preferences by small or large law enforcement departments. Secondly, it is important to note that the majority of departments surveyed felt that forensic services were "Very Important" to "Important" which places a high preference on the services. According to the survey, only 2% of the departments said that they had specific units in charge of processing evidence. And thirdly, when the departments were asked if they had crime laboratories in their departments 79% said "No", 16% said "Yes", and 4% did not give a response. This data also supports the theory that law enforcement departments see a need for forensic science in criminal investigations, but do not have the resources to install it within their departments.

Let us look at the concept of a forensic science technician. What is a forensic science technician? What do the technicians actually do? Reese (2015) presents a forensic science technician position as an individual who is trained in "collecting and analyzing physical evidence" that can be found at a crime scene (Reese, 2015, p. 58). Reese mentions in this article

that a forensic science technician may have an educational/training focus in on-scene or criminal laboratory work (Reese, 2015, p. 58). The position is encouraged to have taken undergraduate courses, or even have a degree, in a science such as biology or chemistry with an influence of criminal justice courses (Reese, 2015, p. 58). For the Alaska-based program model, it will be important to have a specifically designed job description on the particular fields of study or training required for their placement in the program.

The research conducted in the article *Unanalyzed Evidence in Law-Enforcement Agencies: A National Examination of Forensic Processing in Police Departments* by Hickman and Strom (2010) is based on a national-scale research over the span of 5 years. The article presented ideas as to why many pieces of evidence were left unanalyzed. In the beginning of the article it mentioned that a "lack of a suspect in the case was the most frequently cited reason for not submitting forensic evidence for analysis" (Strom & Hickman, 2010, p. 381). It should be argued that though it is true that some pieces of evidence are better analyzed when there is a known suspect to match it to, such as deoxyribonucleic acid (DNA) evidence, there is no specific reason why the evidence should still not be submitted and analyzed for other properties (i.e. broken glass to determine chemical composition).

The most influential factor to consider in determining the type and size of forensic science agency depends on amount of evidence which will be analyzed. With not enough resources backlogs can occur. A Backlog, as defined by Strom and Hickman (2015) is "physical evidence that has been submitted to a laboratory for analysis, but is awaiting processing" (Strom & Hickman, 2015, p. 44). A backlog can also be defined as "evidence within a law enforcement agency that has been delayed in going to the lab" (Strom & Hickman, 2015, p. 44). With evidence backlogged, cases can be halted as the investigators are waiting on results. If the

backlog takes too long, many investigative leads can be gone or difficult to detect by the time the results have been released to the investigators. A backlog is also created because of the limited amount of forensic science facilities in the United States. It is argued within Strom and Hickman's text that some law enforcement departments can hold evidence for long periods of time before taking the evidence to the crime laboratory to be analyzed (Strom & Hickman, 2015, p. 44). The time lapse in evidence processing could cause damage to the evidence along with a great delay in the investigation as previously discussed.

Hickman and Strom discussed that many times evidence that is submitted to a crime laboratory, but not analyzed, causes a backlog (Strom and Hickman, 2010, p. 382). Hickman and Strom note that a backlog does not just occur in crime laboratories, but can be seen within law enforcement agencies as well; rape kits are an example of this. Hickman and Strom note that many rape kits have gone unanalyzed in many agencies across the United States (Strom & Hickman, 2010, p. 382). Without analyzing the rape kits, finding the perpetrator could be near impossible. And even if a suspect is found with other evidence, the court may not substantiate the claim given as they may state that a closer evidentiary connection of the suspect to the crime is needed. Within this article, it is also mentioned that unanalyzed evidence can cause "distrust among crime victims" (Strom & Hickman, 2010, p. 382). Looking at this, a victim may feel that a department is not taking their case seriously as the evidence is not being sent in for analysis.

What are some other reason for evidence backlogs? One of the first arguments made by Strom and Hickman for evidence backlogs is the prevalence of drug evidence being requested over other forms of evidence (Strom & Hickman, 2015, p. 45). Strom and Hickman state that drug evidence is "comprising roughly half of the total volume of forensic requests annually" (Strom & Hickman, 2015, p. 45). With this being the case, other evidence such as trace evidence

could be set aside in order to receive results on the drug evidence first. Drug evidence analyzed by laboratories is around 1, 300,000 requests per the 400 laboratories located throughout the nation (Strom & Hickman, 2015, p. 45).

The second source of backlogs is the "CSI Effect" (Strom & Hickman, 2015, p. 46). The CSI Effect is essentially the media's portrayal of criminal investigations not only being inaccurate, but also that it affects how the public sees crime (Strom & Hickman, 2015, p. 46). This is because the public is expecting more evidence to be presented for criminal cases (Strom & Hickman, 2015, p. 46). Strom and Hickman (2015) note that along with the public, law enforcement and prosecutors are affected as well by The CSI Effect.

When looking at the concept of backlogs, a National Institute of Justice study, that spanned 20 years of law enforcement evidence collection, found that approximately 169,000 unsolved rape cases, as well as 52,000 unsolved homicide cases, had biological evidence that was never submitted to a crime laboratory (Strom & Hickman, 2015, p. 48-9). These staggering numbers show a need for an efficient and unbiased method of evidence collection on-scene. In conjunction with more on-scene collection is having employees in law enforcement agencies who are knowledgeable about what type of evidence holds value for testing. Also presented in this text is the idea of an "artificial backlog" (Strom & Hickman, 2015, p. 49-50). An artificial backlog is defined as "some unknown portion of laboratory backlog that exists, and it is accounted for and awaiting analysis, but the analysis is unnecessary for the purposes of investigating or adjudicating the case" (Strom & Hickman, 2015, p. 49). The reasons for the artificial backlog can be stimulated, "symbolic evidence" collection, evidence that is obsolete as a criminal verdict has been met, or even that there is simply no need for the evidence to be

analyzed but the investigators were directed to submit it to the laboratory anyway (Strom & Hickman, 2015, p. 49-50).

Hickman and Strom's research consisted of a survey that was sent to both state and local law enforcement agencies across the United States. The stated objective of this survey was to find out the number of unsolved criminal cases that contained forensic evidence but had not had this evidence submitted to the crime laboratory for analysis (Strom & Hickman, 2010, 387). Hickman and Strom considered in the survey was each law enforcement department's processes and means of tracking evidence for criminal cases as well as the overall size of their department.

For Hickman and Strom, out of 18,000 agencies in which the survey had been sent to only 2,250 agencies responded. The surveys were in the format of paper, online, and telephonic. All departments were expected to answer the survey for their department in terms of a 5-year span. In regards to evidence not being submitted to a crime laboratory the results are as follows: *Table 1c.*

Unsolved Homicides	14%
Unsolved Rapes	18%
Unsolved Property Crimes	23%

(Strom & Hickman, 2010, 391)

It was shown within the results that in 84% of the unsolved homicide cases the agencies had not submitted evidence to the crime laboratory. The same agencies were larger in size with a staffing of 100 or more sworn officers (Strom & Hickman, 2010, 392). On a regional scale, it was noted that the largest areas for backlogs were within the Southern and Western parts of the United States (Strom & Hickman, 2010, 392).

Peterson's article *A Historical Review of the Demand for Forensic Evidence* (2015) attributes the lack of evidence collection to many factors including an investigator's lack of knowledge and experience in types of evidence to look for, biases of victims and the totality of the crime scene circumstances, as well as the preference of certain types evidence over others (Peterson, 2015, 4).

Peterson discusses Brian Parker's article *Scientific Proof* (1963). Parker found that physical evidence is grossly underused within criminal investigations (Peterson, 2015, 7). After surveying a number of forensic science laboratories, Parker (1963) found that only 1% criminal cases used physical evidence to substantiate their cases, while it was found that approximately 88% of those crimes contained physical evidence that could have been collected and used for the case (Peterson, 2015, 7-8). If even half of the evidence available was collected and used in the cases, the law enforcement officials would have been able to substantiate many more factors of their cases. From this research we may ask the question: Why would law enforcement choose not to collect evidence?

Peterson presented two articles within his text titled *Physical Evidence Utilization in The Administration of Criminal Justice* (1972) and *The Utilization of Criminalistics Services by the Police* (1974). In the article *The Utilization of Criminalistics Services by the Police* (1974) an explanation as to why officers do not collect viable evidence, that could prove crucial in their criminal investigations, is presented. Peterson argues that police, as well as some crime scene technicians, use "filters" while investigating their crime scenes. The "filters" are argued to affect what evidence the officials collect and what evidence they ignore (Peterson & Parker, 1972 & 1974, 10).

According to Peterson, "filters" are considerations made by the police officers and under trained technicians at crime scenes that are based off of factors such as seriousness of the crime, a victim's legitimacy, or even the likelihood of solving the crime (Peterson & Parker, 1972 & 1974, 10). These considerations affect the willingness of the officials to collect evidence (Peterson & Parker, 1972 & 1974, 10). Peterson argues that the more "minor" crime is that the less likely an official is to collect physical evidence as the official may feel that the case is not likely be solved or is not worth the time to be investigated. Peterson also discusses the topic of a victim's legitimacy as being another consideration in evidence collection for officials with "filters". If an official doubts the victim's validity and position in the case there might be a resistance to collect evidence. Lastly, the next filter mentioned is that of a crime's ability to be solved.

Also argued by Peterson was the idea of "servicing" victims at crime scenes (Peterson & Parker, 1972 & 1974, 8). Officials might "service" a crime scene by collecting evidence to appease the victims. By collecting evidence, even though much of it is never intended to be analyzed, the officials are giving the victims the full "service" of a criminal investigation. This is a problem because the officers and technicians who are collecting a mass amount of forensic science evidence are doing so with no intention of having analyzed or be "fruitful" in court. The abundant amount of collected evidence will also take up a great deal of unnecessary room in the evidence storage room.

Equally so if not overly collected, Peterson's article highlighted that on many crime scenes physical evidence is also often overlooked or disregarded. Though Peterson and Parker discussed the results of the research, the reasons for why evidence is overlooked and uncollected

was not covered. The concept of "filters" was discussed, but a deeper look into possible reasons for these oversights were not as covered within this article.

When deciding how to efficiently develop forensic science within the state of Alaska, it is important to note what expectations there are of forensic science evidence by the justice field and public presently. Houck's article *CSI: Reality* (Houck, 2006) focuses mainly on the expectations of evidence. With crime scene investigations, not all evidence is able to be processed and some evidence can be destroyed due to weather or even tampering by an individual. For this reason, evidence must be carefully decided upon as to what will be most useful in a case.

Houck (2006) reviews media and literature's portrayals of the forensic science field. It is true, as pointed out by the article, that there is some literature such as Sir Arthur Conan Doyle's Sherlock Holmes stories that have many factual forensic science techniques. Within the Sir Arthur Conan Doyle story *A Study in Scarlet*, Sherlock Holmes uses a blood detection technique similar to a current forensic science blood detection techniques using reagents to create a precipitate (Sir Arthur Conan Doyle, 1986, 7-8). Unlike the fictional stories of Sir Arthur Conan Doyle's Sherlock Holmes short stories and novels, there are television shows such as the CSI that present forensic science in an unrealistic light.

Within this article, Houck (2006) argues that many judges, attorneys, and juries expect more evidence, or higher quality evidence, than they are seeing submitted by law enforcement officers and forensic science technicians. These officers and forensic science technicians are seeing a push to submit higher quality evidence to the court.

CSI: Reality (2006) highlights the underdeveloped forensic science field currently across the United States. Under the section, *Groaning under the Load*, Houck (2006) presents that though we have much more evidence being submitted from crime scenes than in the past, that

there is not enough forensic science officials to handle all of the evidence. The example of Massachusetts is used as a state with over 6.3 million people and that for the entire state there are only eight DNA analysts throughout the state and three DNA analysts in Boston. This number is staggering as with all the evidence that is submitted daily by law enforcement officers and on-scene investigators can in no way be processed in a quick manner with only the few DNA analysts that Massachusetts has.

With only one state crime laboratory, and a few select forensic science technicians contracted through Alaskan law enforcement agencies, the amount of evidence could be seen as overwhelming. The example of Massachusetts I feel represents a similar situation to Alaska's need to develop a larger forensic science services base to better assess all of the evidence in Alaska. According to Houck (2006), Massachusetts has seen the disparity and is now trying to hire more DNA analysts. One negative point about this article is that some facts, such as the Massachusetts case, does not go into greater detail as to how it plans to spread out its forensic science services.

Houck (2006) also mentions that the Department of Justice's Bureau of Justice Statistics have found from their census of 2002 that to achieve a 30-day turnaround of evidence 1,900 full-time employees would need to be staffed. On top of this, it was also seen that over 500,000 cases are "backlogged" due to this understaffing. On a national level the numbers presented are high, and it can be seen by such evidence that the employing of more forensic services could be one solution to the problem.

This article presents not only the sociological perspective of the media and literature's effect on the public in regards to forensic science, but also notes the real statistics on the understaffing of forensic science officials occurring within the nation. Though the statistics

presented in this article were helpful and thought-provoking, a majority of the article focused on the sociological effect on the public's perception.

Giannelli (2006) discussed how forensic science has progressed through its admissibility as evidence in court and also suggested reforms to the field as a whole. A poignant quote said at the beginning of the article was pulled from the case *Davis v. Mississippi* that is,

*"*We have learned the lesson of history, ancient and modern, that a system of criminal law enforcement which comes to depend on the 'confession' will, in the long run, be less reliable and more subject to abuses than a system which depends on extrinsic evidence independently secured through skillful investigation.*"* (Giannelli, 2006, 310). Despite the arguments against forensic science being a skilled science, the Supreme Court quote shows a confidence in its ability to produce viable results. The idea of forensic science proving itself as a science is a common theme within the article.

In determining forensic science's validity as a science, it is important to note both the *Daubert* Principle as well as the *Frye* Standard. The *Daubert* Principle was when physical evidence was put into question within the *Daubert v. Merrell Dow Pharmaceutical, INC.* (1993) case. Within this case many of the pieces of evidence, as discussed within this article, were questioned for scientific validity. The *Frye* Standard was present before the *Daubert* Principle, in the case *Frye v. United States* (1923) but is still held by many states. The *Frye* standard states that the scientific techniques used must be generally accepted in the relevant scientific community before evidence based on that technique may be admitted into evidence. The article mentions that some states discounted this standard as they felt it was too broad while many other states have kept it because of its greater defense for the defendant.

Giannelli (2006) mentions reforms in regards to possible advancements in the forensic science field. The first reform suggested by Giannelli (2006) is that "rigorous accreditation standards should be mandated" for crime laboratories throughout the nation (p. 312). Giannelli (2006) argues that accreditation of crime laboratories will allow for a more substantial base of services offered within the crime laboratory. Along with this, the accreditation could also give a streamlined standard for all crime laboratories nationwide to follow which would allow different crime laboratories to "converse" easily about forensic science evidence.

Next suggested is the standardization of technical procedures (Giannelli, 2006, 313). The standardization proposed by Giannelli (2006) would consist of descriptions of analytical protocols, equipment calibration and maintenance, and administrative and technical reviews for test results on forensic science evidence within the crime laboratories (Giannelli, 2006, 313). This reform would allow crime laboratories and forensic science services to have a nationally approved approach to assessing crime. This reform would allow for crime scenes to be evaluated in a routine matter that could be seen across the nation.

Another reform suggested by Giannelli (2006) is the need for adequate funding (Giannelli, 2006, 313-14). Giannelli (2006) recognizes in his article that many crime laboratories and forensic science services lack the funds needed to properly equip the agency with the appropriate tools, employees, etc. With more funding, forensic science services could gain more resources that would allow them to assess crimes in a more efficient fashion. Giannelli (2006) also suggests that there is more of a need for research done in the forensic science field; especially in independent research (Giannelli, 2006, 313). Like other scientific fields, Giannelli (2006) notes that it is important for forensic science to also follow the scientific method and strive to find more techniques for analyzing evidence and performing its duties.

The last two reforms suggested by Giannelli (2006) work hand-in-hand with courtroom proceedings; defense experts and full pretrial disclosure (Giannelli, 2006, 314-16). In regards to defense experts, Giannelli (2006) presses the importance of not only having forensic science experts who have analyzed the evidence but also individuals who can also advise counsel about the evidence and have the expertise to testify at trial. Giannelli (2006) makes a point to note the issue of having this forensic science resource available to both the defense and prosecuting parties. It is mentioned within the article that though the American Bar Association (ABA) there is an "adequate access to forensic science experts for both defense and prosecution" but that many courts have attempted to limit these privileges to higher level cases (Giannelli, 2006, p. ##). The concept of full pretrial disclosure deals with the idea that evidence should be fully analyzed and discussed with counsel previous to trial. Given the amount of time needed to analyze forensic evidence, it is not possible to re-analyze a piece of evidence during trial.

White et al. (2015) discusses the need for DNA evidence in criminal cases. The authors mention that Locard's Exchange Principle asserted that humans do carry and leave evidence everywhere that they go; whether it is hair, skin cells, or blood we are "vehicles" for evidence (p. 122). Locard's principle is an important concept to forensic science as it illuminates the fact that evidence, large and small, is present at a crime scene, and that it is up to the investigator to find it. By following common areas of human interaction, within its environment such as the bathroom sink, bathtub, couch, or even door knobs investigators have a chance of collecting evidence that will provide DNA results. DNA evidence, like many other types of evidence, not only incriminates it also exonerates. Much like fingerprints, DNA is not class evidence that allows for a broader selection of possible suspects, DNA is able to closely tie the genetics of a piece of evidence to the genetics of the perpetrator. DNA is found in many forms of biological

matter such as blood or saliva (White et al., 2015, 123). Though all science retains a small percentage of room for error, DNA evidence allows for an even smaller percentage.

Davis et al. (2014) illuminates the use of forensic science in cold case investigations. There are still several unsolved cold cases within the law enforcement agencies throughout Alaska. The use of more forensic science services to solve these cold cases would be a major benefit to the state. Though the article on a large scale deals with the overall process of evaluating cold cases, it does lightly go over the need of forensics services in relations to cold cases.

DNA is a main topic for discussion within Davis et al.'s article stating that the ability to analyze hair, skin, and body fluids for DNA allows for many crimes, once thought to be unsolvable, to be solved. This article notes that for years, a great deal of law enforcement criminal investigations have been focused on eyewitness testimony to solve crimes. Davis et al. (2014) supports this with a study presented in 1977 by the RAND Corporation which stated that "80% of cases were solved at the crime scene by actions of responding officers or by information about the about the identity of the perpetrator supplied by a victim or witness" (Davis et al., 2014 375). Following this, it is mentioned that "methods that proved so effective in the past have become insufficient today" (Davis et al., 2014, 375). An example of this insufficiency can be seen with the "CSI Effect" previously mentioned by Strom and Hickman. The "CSI Effect", brought on by the entertainment industry, is changing the juror's perspective to what is and is not evidence. Despite the unrealistic view of some factors found within the television series, it is important that the criminal justice field understands that eyewitness testimony for many will not hold a great deal of weight when convicting a defendant. Also mentioned was the benefit of having the Combined DNA Index System (CODIS) available to law enforcement (Davis et al.,

2014, 376). CODIS is a nationally shared system which includes DNA from all law enforcement agencies which allows for a great deal of DNA to be compared with suspect or unknown DNA samples (Davis et al., 2014, 375). With an individual's DNA on file, law enforcement is able to match possible forensic samples to already archived samples to hopefully bring a match.

The highlighting of DNA analysis in cold cases shows the crucial need for forensic science services. Though it is true that on-scene forensic science technicians do not analyze DNA evidence, it is the on-scene technicians that will be looking for evidence that not only contains DNA but will also be looking for evidence that will contain enough viable DNA for analysis. Some pieces of evidence are better to collect than others (i.e. buccal swabs of cheek cells). Another example of viable DNA-containing evidence is hair. Hair can not only show a person's DNA but can reveal a possible cause of death such as poisonings. The knowledge and logical decision-making on part of the on-scene technicians will prove crucial to the crime laboratory's analysis.

This article also discusses the need an intricacies of DNA evidence. The article overall discusses the two largest DNA databases that are held by the United States and China. It is argued within *Future Directions in Forensic DNA Databases* that there are two main formats in DNA databases; reference profiles and forensics profiles (Ge et al., 2014, 163). Reference profiles is a section that contains DNA evidence collected from known individuals who have been convicted of a crime(s) (Ge et al., 2014, 163). Within the article the profiles are also deemed "arresting profiles" (Ge et al., 2014, 163). The second type of profile is forensic profiles. In forensic profiles DNA evidence is submitted from crime scenes of unknown perpetrators (Ge et al., 2014, 163). This evidence is submitted in hopes of finding a DNA match at some point.

Future Directions in Forensic DNA Databases brings up that the DNA database can also be used for aiding in searches for missing persons as well as identifying currently unidentified remains that have been found. An example used within the article to illustrate this is in June of 2013 when 2,455 trafficked children had been located with the aid of China's DNA database (Ge et al., 2014, 163). Seeing the use of DNA evidence to aid in finding victims on such a global scale shows the extreme need for DNA evidence collection on-scene and later analysis in the crime lab.

In the end of the article, it is argued that the future of DNA forensic science may see road blocks given the current testing method used for DNA analysis. The current testing method is debated as it only uses 25-30 autosomal short tandem repeat (STR), repeating sequences of DNA, are able to be analyzed within one kit (Ge et al., 2014, 165). The authors present that with this limited scope of analysis some evidence may be left unanalyzed that could link a victim or suspect in a crime.

With all of the facts presented within this article, there is a clear need for more DNA evidence collection on-scene during criminal investigations. Though it is true that an on-scene forensic science technician will not work in the laboratory, but knowledge as what type of DNA evidence to collect will allow for the best possible outcome when having the evidence analyzed. Despite the massive DNA databases found in the United States and China it is still mentioned within this article that there is room to grow. With more DNA evidence collected at a crime scene, and submitted to a crime lab for analysis, the databases can grow to aid in the solving of more crimes. Perhaps the DNA evidence collected in the first case may not find any leads as it is the first of the individual's DNA is to be entered into the database, but perhaps the next time that individual commits a crime a comparison can be done and the perpetrator can be caught.

Regardless, the use of DNA evidence and analysis begins with the on-scene forensic specialists who are trained on what types of DNA evidence to collect as well as how to properly collect it.

Winston and Gallop highlight the implementation of privatization in the field of forensic science and how it conflicted with the public's need (Wilson & Gallop, 2013, 69). Budgets for creating a new program is crucial. Though both cost saving and efficiency are important factors to consider, it is the unnecessary "cutting of costs" which can lower the integrity of product being produced. Wilson and Gallop (2013) argue that the problems in the forensic science field of today is effected by the lack of research currently available. A lack of forensic science research leads to problems for investigators conducting on-scene investigations (Wilson & Gallop, 2013, 72). Wilson and Gallop (2013) also discuss the FSS's use of competition with other agencies. Looking at the Alaska program model I suggest, this paper discusses the need for a connection with other agencies instead of the competition seen with the FSS.

A great deal can be learned, while in the process of developing more forensic science within a state, from the mistakes found in similar programs. From these detrimental outcomes, future programs can avoid such mistakes. Wilson and Gallop (2013) discuss the flaws present in United Kingdom's Forensic Science Service (FSS) which ultimately resulted in its disbandment. Wilson and Gallop argue that one of the main reasons for the FSS failed was due to the perceived "need to resolve the fundamental and interconnected problems of UK forensic science: inadequate funding and research, weak epistemic authority and a lack of support for defence lawyers" (Wilson & Gallop, 2013, 69). There were other arguments made within the article that the use of privatization conflicted with the public's need for the forensic science services (Wilson & Gallop, 2013, 69). Privatization focuses a great deal on cost saving and efficiency

(Wilson & Gallop, 2013, 70). Though both cost saving and efficiency are important factors to consider, sometimes the "cutting of costs" can lead to a low integrity of product being produced. Looking at this concept, it is important in the Alaska-based forensic science services model that the program not sacrifice its ability to perform its duties in order to save the program money. Wilson and Gallop argue that "forensic science cannot be financed solely based on the basis of what it costs to provide efficient day-to-day services to the police, courts, and defence lawyers" which put weight on not only the cost effective method of processing the evidence but also the research and integrity of the evidence analysis itself (Wilson & Gallop, 2013, 72).

The emphasis on quantity over quality, you could say, causes a conundrum to the group who is planning to create and implement a forensic science program. Though quality is extremely important, many other criminal justice agencies will expect inexpensive and timely results. Wilson and Gallop (2013) argue that a great deal of the problems in the forensic science field today is the lack of research which in turn trickles down to the practical application of analyzing crime scene evidence (Wilson & Gallop, 2013, 72). Though this program does not suggest to have budgetary funds delegated to forensic science research, Wilson and Gallop (2013) have argue that more research aids in developing a program; perhaps lack of viable research to a forensic science field may equal an inopportune time to build it into the program for a forensic science program.

Wilson and Gallop (2013) conclude that the FSS's use of competition with other agencies caused a major problem for its overall function and a possible reason for its disbandment (Wilson & Gallop, 2013, 76). Also Wilson and Gallop argue that the FSS extended itself too far by "seeking to enlarge its market" while it was unable to "satisfy police requirements" (Wilson & Gallop, 2013, 76). In considering this, it is important to work an agency within its mission

statement and overall connections to the agreed upon parties. An expansion to other parties should only occur when it is functioning properly currently and is still extrapolated to be able to cover its original goals while adding on to its original parties.

Goldstein (2011) brings up the idea of using a state's supervision to maintain properly functioning set of forensic science services. . Goldstein focuses on the Houston crime laboratory and how it had been operating below standard conditions (Goldstein, 2011, 225). The below standard guidelines used within the agency caused many improprieties including the "fabrication of scientific results" and under-trained staff (Goldstein, 2011, 225). It was extrapolated that the crime laboratory, under these poor conditions had analyzed evidence for over 3,500 criminal cases, some of which were death penalty charges (Goldstein, 2011, 225). If this evidence was poorly analyzed, it is quite possible that connections were drawn in cases for perpetrator and victims that are incorrect. The impact of these transgressions leaves little room for argument as faulty evidence can leading to lasting consequences for the involved parties. Along with effects to the accused, improperly analyzed evidence can lead to perpetrators not being caught and remaining a threat to the public.

Goldstein (2011) also discusses the privatization of crime laboratories and how that effects the law enforcement community (Goldstein, 2011, 230). Goldstein (2011) remarks on many weaknesses within the forensic science field such as the lack of standardization throughout the nation (Goldstein, 2011, 231). Analyzing Goldstein's research in reverse, this narrative will consider factors of a failed program in order to illustrate an example of a functioning forensic science service program within the state in Alaska.

Within this investigation, it was noted that the Houston crime laboratory had been operating below standard conditions (Goldstein, 2011, 225). The conditions included

"fabrication of scientific results", under-trained staff, and contamination of evidence (Goldstein, 2011, 225). It was extrapolated that the crime laboratory, under these poor conditions had analyzed evidence for over 3,500 criminal cases, some of which were death penalty charges (Goldstein, 2011, 225).

Goldstein (2011) argues that forensic science services has worked within law enforcement since its beginnings but has functioned "without significant external regulation" (Goldstein, 2011, 230). This lack of oversight could cause a sense of disconnection between various forensic science services. Continuing on this thought, Goldstein (2011) argues that the privatization of crime laboratories has caused a continued dispersion of the forensic science field (Goldstein, 2011, 230). It is then presented by the article that the job of oversight is unclear by having so many "overlapping" agencies within forensic science (Goldstein, 2011, 231). As mentioned by Giannelli (2006), Goldstein (2011) points out the weakness in having a lack of standardization throughout the national for it forensic science services (Goldstein, 2011, 231).This breakdown of structure within the field of forensic science is interesting when considering formation of a more unified forensic science organization within the state in Alaska. Goldstein (2011) considers the further "fragmentation" to continue by the different professions which are collecting and analyzing evidence such as "laboratory technicians, sworn law enforcement officers, or crime scene investigators" (Goldstein, 2011, 231).

How does one know when it is the "correct time" to implement a program? Do particular opportunities need to be present for program implementation to be done at a "correct time"? Kingdon and Thurber (2003) theorized that "An issue is most likely to achieve public agenda status when public problems, policy alternatives, and political opportunities intersect" (Kingdon & Thurber, 2003, ix). With this theory we can further process the acceptance of a solution to a

problem if (1) a problem exists which is recognized by the public, (2) parties are looking for policies which will change the current situation are being sought, and (3) political parties are willing to implement a change within the current system. The problem, which falls under this particular theory requires recognition from the public, is the underdevelopment of forensic science services within the state of Alaska. The parties looking at policies and possible proposals for change would be the local law enforcement agencies. And finally, the political parties involved how would be allowing the change would be local government officials (i.e. mayor) and even to the state level.

Kingdon and Thurber (2003) argued that a major deciding factor within a program is needed for the administration's acceptance of it (Kingdon & Thurber, 2003, 19). Kingdon and Thurber argue that if the administration were to have positive feelings towards a proposal, the individuals working underneath the administration would feel positive about it well (Kingdon & Thurber, 2003, 19). This dependence of acceptance causes the administration to be an essential factor within the implementing of a plan. From looking at this, Kingdon and Thurber note a "national mood" as being an important political factor to consider (Kingdon & Thurber, 2003, 20). A nation's current perceptions can add a great deal of emphasis to the governing body's decisions in what is and is not important to implement. If the nation sees a large amount of violent crimes with little evidence being process, and the nation perceives this as a problem, it could be possible for politics to listen to proposals for more forensic science services. Equally so, if the nation is not hearing much media on forensic science and crime rates, politics may not feel the need for "extra expenses" to fund forensic science services.

Discussion

When looking at the exact structure for a forensic science on-scene technician program it is important to note that something entirely new does not need to be created; current agencies can work in partnership with the new program in terms of housing and directing the units. Budgeting for the program itself though will be an important part of the composing of the program. The line-item budget in combination with a performance formatted budget would be a beneficial tactic for this particular program. Peak (2016) discusses several types of budgets used by criminal justice agencies. The line-item budget format allows for the extremely detailed nature of all purchases to be thoroughly documented (Peak, 2016, 373). This excessive nature is beneficial for all of the equipment and training needed by the forensic science technicians. The ability to present all of the purchases made allows any questions of excessive spending to be negated. Peak (2016) notes that one problems seen with line-item budgets is "its limited ability to evaluate performance" (p. 373). This deficit in the line-item budget is what make the hybrid with a performance budget so appealing. The performance budget format is based on an "input-output" function in which anything that the agency or program spends must go to a viable, tangible, usable outcome (Peak, 2016, 376). This means that at the end of each fiscal year the program will be tested within each of its departments as to how their money was spent. If a specific department spent money without a usable outcome, less to no funding may be designated to that department the next fiscal year. This in the terms of forensic science programs can be a detriment and a benefit. Problems such as crime laboratory backlogs can cause a hindrance to the expediency in which evidence can be processed. On the other hand, if the program is evaluated on its amount of evidence collected verses courtroom presentation of evidence there may be a more streamlined focus for the performance of the budget.

When looking at the position of on-scene forensic technicians, within the context of Alaska, it is important to note that the employee(s) will be in a civilian and unsworn status. This means that the on-scene forensic technician will not be a law enforcement officer, but will be in the law enforcement career field. The fact that an employee assessing crime scenes is a civilian can cause resistance in a historically paramilitary career field. Wilkerson (1994) discusses the idea that many police departments are becoming overloaded with calls for police assistance without the ability to have enough sworn officers to aid those needs (Wilkerson, 1994, 21). Wilkerson (1994) suggests that a possible solution to this is to employ civilian positions within the police department. By employing civilian positions, the department can both save money as well as assess more criminal acts given the more employees within the department. Looking at the City of Wilmington of North Carolina, a civilian crime scene technician is paid $32,947.20 to $41,184.00 annually. Alternatively, a sworn police officer position, at the same department, pays $36,123.36 to $45,165.12. The monetary difference between the two positions could mean a great deal of extra funds for the law enforcement agency.

When looking at the beginning part of the process, the interpersonal and social functioning of a police department, Wilkerson (1994) argues that the need for officer "buy in" to civilian employees in law enforcement capacities is essential (Wilkerson, 1994, 21). Law enforcement officers build camaraderie through their stressful work load, and without this connection, Wilkerson (1994) argues a civilian position can be difficult to implement (Wilkerson, 1994, 21). Keeping the argument made by Wilkerson (1994) in mind, it will be important when implementing the on-scene forensic science technicians in Alaska to have the civilian technician positions work and train closely with law enforcement officers to build a camaraderie within the department. The working and training of civilian technicians with

officers will happen to a degree within the job position of on-scene work, but will also need to be in the mind of the supervisor when initially training their new technicians in order to create a "cohesive team" as described by Wilkerson (1994).

Wilkerson (1994) illuminates a few legal issues concerning this topic in his article *Civilian Services*. Within this article Wilkerson (1994) notes that legal issues regarding liability, taken by the department, holds a great deal of weight in the employing of a civilian employee in law enforcement (p. 21). Though Wilkerson (1994) notes that the liability problems are equitable with those with sworn law enforcement personnel, topics such as training and supervision which play a key concern in a civilian law enforcement employee's position (Wilkerson, 1994, 21). In this particular suggestion, of on-scene forensic technicians in Alaska law enforcement agencies, the training would not only need to be streamlined across the state for all technicians but also monitored closely by the respective law enforcement agencies. Any agency overseeing the quality of the technicians training will most likely be looking for a well-rounded and documented training regime for every technician. It will be crucial, because of this, to have the training for all technicians planned before the program is implemented.

Training in the forensic science career field is very diverse and can cover an array of scientific topics. Because of the diversity in forensic science training the state of Alaska, when designing the position of on-scene forensic science technicians, will need to decided upon for all regions. Some of the training and education needed for the position can be previous and the rest can be on the job training with both in state and out of state training opportunities. Necessary knowledge for applicants to the position may be latent print, bloodstain analysis, evidence collection, chain of custody, and crime scene photography skills. With the previously mentioned training and education required for employment, the state of Alaska would then only need to

supplement addition trainings to the technicians at less cost to the state. But given the possible different trainings and educational institutions in which the applicants received this information from will need to be compared for likeness in level of knowledge.

In regards to supervision, which was mentioned by Wilkerson (1994), it is important in this particular employment model to have a tiered system of supervision. First, the supervision will lie with the police department in which the technician(s) is employed in. The sergeants, lieutenants, up to the chief of the police department will need to have immediate oversight of the technician(s). The use of direct, tangible, oversight of the technicians will allow a flow of communication and problem-solving both on-scene as well as in other parts of criminal proceedings. The next form of oversight will need to be the Alaska State Crime Laboratory. The oversight of the Alaska State Crime Laboratory will allow a connection of direct knowledge of forensic science as well as a consultant to on-scene situations.

Wilkerson (1994) discusses the importance of proper selection in the hiring process of the civilian law enforcement employees. Wilkerson notes that a possible negative possibility in hiring civilian employees within law enforcement is that "civilians who want to become sworn officers may overstep their bounds in an effort to prove themselves" (Wilkerson, 1994, 21). If a civilian acts outside of their job description in law enforcement the action(s) can prove to be not only troublesome but also dangerous. Also, if an individual is applying to a civilian law enforcement position in order to see if they want to pursue a career as a sworn position could cause imprudent actions, such as ignoring assigned duties and attempting to integrate into sworn duties, due to the passion of working as a law enforcement officer. In regards to hiring the on-scene forensic technicians within Alaska it will be important to consider this factor as well. An on-scene forensic technicians are employed to analyze, collection, and present evidence found at

crime scenes throughout the criminal proceedings. The on-scene forensic technician applicant needs to be aware that sworn police duties are not within their work purview.

Wilkerson (1994) presented the labor and cost benefits for hiring civilian employees. Wilkerson (1994) briefly discusses the findings of the Bowling Green Kentucky Police Department and that "civilianization", given their study from 1989 to 1992, can "save thousands of hours of work for sworn police officers and thousands of dollars for the department" (Wilkerson, 1994, 21). To be more specific, Kentucky found that within their department they would save $40,000 per year in hiring civilian employees verses employing sworn officers (Wilkerson, 1994, 21). With both the labor and cost benefits to a department, the excess funding could be directed to other parts of law enforcement such as highway patrol or technology for police tactical teams. Also, by keeping a great deal of the training within the state with viable training facilities such as the Alaska State Crime Laboratory, the program in Alaska can save a great deal of money.

Similar to Wilkerson (1994), Colletti (1996) argues that law enforcement has strayed from its original connection with the community and is instead focusing too greatly on the paramilitary structure of policing (Colletti, 1996, 8). Colletti (1996) attributes a great deal of the resistance to employ civilians within a law enforcement agency is due to the attempt to "banish political corruption and influence" (Colletti, 1996, 8). Though Colletti (1996) focuses mainly on the employment of civilians at the high-ranking supervisory level, the argument can still hold to civilian employees in other capacities within law enforcement agencies as well. Colletti (1996) sees the use of a civilian employee to be "a bridge between the community and department" (Colletti, 1996, 8).

"Bridging the gap" between communities and law enforcement departments holds true to on-scene forensic science technicians as they are not just analyzing and collecting evidence; technicians also can interact with the parties on-scene to get a clear idea of factors to note in relation to the crime scene that may have been there previous but now are not and even possible means in which the crime occurred. On-scene forensic science technicians within this program will also be expected to work with the state crime laboratory which employs civilian positions. The positive connections with the crime laboratory and their civilian employees and the police department is crucial for any law enforcement agency.

Constructing an on-scene forensic science technician program for the state of Alaska requires three major considerations: (1) civilian positions status; (2) streamlined training and education basis for technicians; and (3) location placement that is accessible to neighboring towns and agencies.

The concept of having the technicians within this program being civilian positions falls in with the research presented by Wilkerson (1994). As referenced in the Bowling Green Kentucky Police data collected by Wilkerson (1994), civilian positions do not cost as much as a as a sworn officer position and can leave money over for the agency to use for other sections of the department (i.e. Tactical Team training). Also noted by Wilkerson (1994), is the idea that a civilian position can help the workload of sworn officer positions. With the volume of calls presented to sworn police officers on a daily basis, having civilian on-scene forensic science technicians would allow for less officers to be detained on a particular call. Similar to the use of civilian dispatching positions, civilians on-scene forensic technicians allows for an accessible and cost-saving benefit to a police department.

Giannelli (2006) discusses the idea of proper accreditation and standardization within crime laboratories aiding in the streamlined, consistent analysis of forensic science evidence. Applying the idea of streamlined work can reflect the use of standard training for all Alaskan on-scene forensic science technicians. By having each of the technicians attend the same forensic science trainings can allow for a training standard for the program as a whole. This way, all of the technicians will process every scene with the same protocols determined within their training regime. Another factor to consider in standardization of the on-scene forensic science technicians is the attention to training acquired by the applicants prior to hiring. When hiring the technicians, the program will need to have a set of standards prepared in which he applicants must meet. The standards are used as a tactic to avoid hiring technicians of varied levels of education and previous training. For example, if the standard is to hire only technicians who have Bachelor's degrees in the Criminal Justice or Physical Sciences, then hiring an individual who only has an Associate's degree may put them at a disadvantage. Also, in this example the type of degree or total amount of course hours towards a certain topic such as Biology will need to be specified as well (i.e. 120 hours of coursework in Biology or other Physical Science).

With the underdevelopment of on-scene forensic science services in Alaska, the current forensic science resources are the State of Alaska Crime lab, Alaska State Troopers, and local law enforcement agencies. Alaskan law enforcement agencies have 586,412 square miles of state land to enforce and investigate. This amount of area spreads the current forensic resources very thin. Law enforcement officers within Alaska have a great many other tasks to complete in their daily jobs such as conducting traffic stops and welfare checks which also can take away from the amount of time that they have to process a crime scene. By employing civilian on-scene forensic

science technicians within the state of Alaska will lessen the resources of sworn law enforcement officers.

When looking at the idea of placement of the on-scene forensic science technicians, it is important to consider areas in which not only have the need for the services but can also transport the technicians to other agencies if mutual aid is needed. To begin the program, the technicians will be regionally-based by having two technicians at Fairbanks, two technicians at Anchorage, one technician at the North Slope, and two technicians at Sitka would spread out the given resources. This spread of technicians provides a basis of forensic science coverage throughout the state. By having the technicians based in larger cities the ability for transport to smaller villages will be more likely. The specialist needs to be based out of a city and then transported to scenes outside of their "home" city. An example of this would be a specialist who was based in Fairbanks, but was transported out to Delta Junction; this specific specialist would be employed within the Interior region.

Conclusion

When looking at the forensic science services within Alaska, the vastness of land compared to just over 1,000 law enforcement officers reflects a daunting task to the agencies involved. The implementation of an on-scene forensic science technician program which employs civilian technicians within the state of Alaska is a possible solution to deal with this particular predicament. For the implementation of this program, the on-scene technicians will be placed on a regional basis (i.e. central, southeast).

By having the technicians placed in a larger law enforcement agency within the region allows for easy transport to other smaller cities and villages. The on-scene forensic science technician program will require the use of standardized training for all technicians. The

education and training of the applicants for the position needs to be considered as well. By having a standard procedure for crime scene analysis will allow for the program to work in a streamlined fashion with all law enforcement agencies across Alaska. Not only is the use of civilian positions cost effect to law enforcement agencies (Wilkerson, 1994), but civilian positions also allow for sworn law enforcement officers to attend to their many other necessary duties at crime scenes.

References

Aleksander, A., MD, Ph.D. (2012). *Forensic Expertise and Judicial Practice: Evidence or Proof?* Journal of Evaluation in Clinical Practice. 1147-1150.

Ballou, S., Goodpaster, J., MaeCrehan, W., Reeder, D. (2003). Forensic Analysis. *Analytical & Bioanalytical Chemistry*. 367.

Colletti, J. L. (1996). Why not hire civilian commanders? *FBI Law Enforcement Bulletin*, *65*(10), 8.

Davis, R., M.S., Jensen, C., III, Ph.D, Burnett, K. (2014). Working Smarter on Cold Cases: Identifying Factors Associated with Successful Cold Case Investigations. *Journal of Forensic Sciences*. 59(2). 375-382.

Daubert v. Merrell Dow Pharmaceuticals, INC, 509 S. Ct. 92 (9th Cir. June 28, 1993).

Department of Labor and Workforce Development: Research and Analysis, & State of Alaska. (2016, January 13). *2015 Population By Borough/Census Area and Economic Region* [Fact sheet]. Retrieved from http://labor.alaska.gov/research/pop/popest.htm.

Doyle, A. C., Sir. (1986). *Sherlock Holmes: The Complete Novels and Stories* (Vol. 1). New York, NY: Bantam Classics.

Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

Ge, J., Sun, H., Li, H., Liu, C., Yan, J., Budowle, B. (2014). Future Directions in Forensic DNA Databases. *Croat Med*. 163-166.

Goldstein, R. (2011). Improving Forensic Science Through State Oversight. *Texas Law Review*, *90*(1), 225-258.

Houck, M. M. (2006). CSI: Reality. *Scientific American*. 295(1), 84-89.

Giannelli, P. (2006). *Forensic Science*. *Journal of Law, Medicine, & Ethics*. 310-319.

Kingdon, J. W., & Thurber, J. A. (2003). *Agendas, Alternatives, and Public Policies* (2nd ed.) Addison-Wesley Educational Publishers Inc.

Lambert, E., Hogan, N., Nerbonne, T., Barton, S., Watson, P., Buss, J., Lambert, J. (2007). Differences in Forensic Science Views and the Needs of Law Enforcement: A Survey of Michigan Law Enforcement Agencies. *Police Practice Research.* 8(5). 415-430.

Lyle, D. P. (2008). *Forensics: A Guide for Writers*. Cincinnati, OH: Writer's Digest Books.

Peak, Kenneth. *Justice Administration: Police, Courts, and Corrections Management*. 8th ed. Pearson, 2016. Print.

Peterson, J. (2015). A Historical Review of the Demand for Forensic Evidence. *Forensic Science and The Administration of Justice: Critical Issues and Directions*. 3-10.

R. Roenfanz, Statewide Services Division, Criminal Records & Identification Bureau, & K. Monfreda, Comps. *Crime in Alaska 2013: Uniform Crime Reporting* (2013). Department of Public Safety/ Federal Bureau of Investigations.

Reese, S. (2015). Forensic Science Technician. *Connecting Education & Careers*, *90*(4), 58-59.

Strom, K., Hickman, M. (2010). Unanalyzed Evidence in Law-Enforcement Agencies: A National Examination of Forensic Processing in Police Departments. *Criminology & Public Policy*. 9(2).

Strom, K., Hickman, M. (2015). What We Know (and Don't Know) About Evidence Backlogs. *Forensic Science and The Administration of Justice: Critical Issues and Directions*. 43-53.

United States Census Bureau. (n.d.). *Quick Facts Alaska* [Fact sheet]. Retrieved from http://quickfacts.census.gov/qfd/states/02000.html.

White, M., Borrego, A., Schoeder, D. Assessing the Utility of DNA Evidence in Criminal Investigations. *Forensic Science and The Administration of Justice: Critical Issues and Directions*. 121-135. 2015.

Wilson, T. J., & Gallop, A. M. C. (2013). Criminal Justice, Science and the Marketplace: The Closure of the Forensic Science Service in Perspective. *The Journal of Criminal Law*, *77*(1), 56-77.

Wilkerson, B. (1994). Civilian Services. *FBI Law Enforcement Bulletin*, *63*(11), 21.

City of Wilmington. (n.d.). Crime Scene Technician. Retrieved from: https://www.governmentjobs.com/careers/wilmingtonnc/jobs/1690304/crime-scene-technician.

City of Wilmington. (n.d.). Police Officer - Certified. Retrieved from: https://www.governmentjobs.com/careers/wilmingtonnc/jobs/1601072/police-officer-certified.